Data 101: Progress Monitoring to Improve Student Outcomes

Dr. Tessie Rose

Progress monitoring is defined as repeated measurement of academic performance to inform instruction of individual students in general and special education. It is conducted at least monthly to (a) estimate rates of improvement, (b) identify students who are not demonstrating adequate progress and/or (c) compare the efficacy of different forms of instruction to design more effective, individualized instruction (NCRTI, 2009).

Upon completion of this training, participants will be able to:

1. implement reading curriculum based measurement (CBM) with high fidelity,
2. set realistic progress monitoring goals based on validated practices, and
3. interpret student progress monitoring data charts.

Session Agenda

- Welcome and Introductions
- Administering and Scoring of Reading CBM
- Setting Realistic Goals
- Interpreting Progress Monitoring Graphs
- Wrap-up
  - Selecting Evidence Based Progress Monitoring Tools (www.rti4success.org)
  - Ensuring Accuracy of Implementation

About the Presenter

Tessie Rose, Ph.D., is co-coordinator of technical assistance for the *National Center on Response to Intervention* and adjunct professor of education at the University of Virginia - NOVA. Prior to joining Center, she was assistant professor of special education at the University of Nevada, Las Vegas. She has served as a general and special education teacher, an educational consultant for several large school districts, and the project coordinator for several grant and contract projects, including model demonstration sites in progress monitoring and response to intervention in elementary and secondary schools. She has conducted introductory to advanced trainings in RTI related topics for teachers, school/district administrators, and state education agencies in nearly 36 states. Dr. Rose completed her doctoral degree in special education at the University of Utah and post-doctoral research in response to intervention at Lehigh University.

Recommended Resources

National Center on Response to Intervention (www.rti4success.org)

Research Institute on Progress Monitoring (www.progressmonitoring.net)

National Center on Progress Monitoring (www.studentprogress.org)

Progress Monitoring to Improve Student Outcomes

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National Center on Response to Intervention

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General Outcome Measures from Other Fields

Medicine measures height, weight, temperature, and/or blood pressure.

Federal Reserve Board measures the Consumer Price Index.

Wall Street measures the Dow-Jones Industrial Average.

Companies report earnings per share.

McDonald's measures how many hamburgers they sell.

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Common Characteristics of GOMs

Simple, accurate, and reasonably *inexpensive* in terms of time and materials.

Considered *so important* to doing business well that they are *routine*.

Are *collected* on an *ongoing* and *frequent basis*.

Shape or *inform* a variety of important decisions.

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Curriculum Based Measurement (CBM)

- AKA as a general outcome measures (GOMs) of a student's performance in either basic skills or content knowledge
- CBM development began in the mid 1970s
- Includes alternate forms to allow time series data to be collected on student progress
- CBM tools available in core subject areas grades K-8
  - Can be used with older kids lacking basic skills
  - Can be used with students with low incidence disabilities

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CBM was Design to Provide Educators With.......

The same kind of evaluation technology as other professions...

Powerful measures that are:

- *Simple*
- *Accurate*
- *Efficient* indicators of student achievement that *guide* and *inform* a variety of decisions

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CBM is Used for Scientific Reasons Based on Evidence:

It is a *reliable* and *valid* indicator of student achievement.

It is *simple, efficient*, and of *short* duration to facilitate frequent administration by teachers.

It provides assessment information that *helps teachers plan better instruction*.

It is *sensitive to the improvement* of students' achievement over time.

It is *easily understood* by teachers and parents.

Improves achievement when used to monitor progress.

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Things to Always Remember About CBM

Are designed to serve as *"indicators"* of general reading achievement. R-CBM doesn't measure everything, but measures the *important* things.

Are *Standardized tests* to be given, scored, and interpreted in a *standard way*.

Are *researched* with respect to psychometric properties to ensure accurate measures of learning.

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Items to Remember (continued)

Are *Sensitive* to improvement in *Short Periods* of time.

Also tell us *how* students earned their scores (*Qualitative* Information).

Designed to be *as short as possible* to ensure its *"do ability."*

Are *linked to decision making* for promoting positive achievement and Problem-Solving.

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Benefits of Using *CBM*

Are written to represent *general curriculum* or be *"curriculum independent."*

Allow decision making about reading growth, regardless of between-school, between-school-district, between-teacher differences in reading curriculum.

Are *graded* to be of *equal* difficulty.

Have numerous *alternate forms* for testing over time without practice effects.

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EXAMPLE CBM:

Reading – Curriculum Based Measurement (R-CBM)

Students read aloud for 1 minute from *Standard Reading Assessment Passages* of meaningful, connected text.

Number of words read correct and number of errors are counted.

Reported as WRC/errors

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Administration and Scoring of R-CBM

What Examiners Need To Do...

- *Before* Testing students
- *While* Testing students
- *After* Testing students

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Things you Need Before Testing

Standard Reading Assessment Passage Student Copy:

- No numbers
- Between 250-300 words (exception: 1st grade)
- An informative first sentence
- Same font style and size
- Text without pictures
- Obtain from your LAM

I can say many numbers. First I say "one," and then I say "two." I can count very high, but I can't count every number. Even though I can write many numbers, I can never write every number. I would run out of time and space before I could finish. Numbers keep going forever.

I see numbers just about anywhere I look. Numbers help us every day. You can put them together to add. You can take them away to subtract. Numbers help measure how long, short, and wide things are. Numbers tell us how much food and toys cost. They tell us how many miles we have left to drive until we get home. Numbers tell us how fast we ran a race. They let us know how many points our team scored in a game. Numbers tell us how tall we are. They help us figure out how much we've grown. They let us know what size our hands and feet are.

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Things you Need Before Testing

2. Standard Reading Assessment Passage Examiner Copy:

- Pre-numbered so they can be scored quickly and immediately.
- Obtain from your LAM.

I can say many numbers. First I say "one," and then I say	13
"two." I can count very high, but I can't count every number.	25
Even though I can write many numbers, I can never write every	37
number. I would run out of time and space before I could	49
finish. Numbers keep going forever.	54
I see numbers just about anywhere I look. Numbers help	64
us every day. You can put them together to add. You can take	77
them away to subtract. Numbers help measure how long,	86
short, and wide things are. Numbers tell us how much food	97
and toys cost. They tell us how many miles we have left to	110
drive until we get home. Numbers tell us how fast we ran a	123
race. They let us know how many points our team scored in a	136
game. Numbers tell us how tall we are. They help us figure	148
out how much we've grown. They let us know what size our	160
hands and feet are.	164

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3. Additional Assessment Aids Will Depend on CBM Tool

Examples:
- Transparencies or paper copies of examiner passages
- Stop Watch (required—digital preferred)
- Palm Pilots
- Clipboard
- Dry Marker or Pencil

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Setting up Assessment Environment

Assessment environments are flexible and could include...

- A set-aside place in the classroom
- Reading station in the hall way
- Reading stations in the media center, cafeteria, gym, or empty classrooms

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Things You Need to do While Testing

Follow the standardized directions:

- R-CBM is a standardized test
- Administer the assessment with consistency
- Remember it's about testing, not teaching
- Don't teach or correct
- Don't practice reading the passages
- Remember *best*, not fastest reading
- Sit across from, not beside student

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R-CBM Standard Directions for 1 Minute Administration

1) Place the *unnumbered* copy in front of the student.
2) Place the *numbered* copy in front of you, but shielded so the student cannot see what you record.
3) Say:

> When I say 'Begin,' start reading aloud at the top of this page. Read across the page (DEMONSTRATE BY POINTING). Try to read each word. If you come to a word you don't know, I will tell it to you. Be sure to do your best reading. Are there any questions? (PAUSE)

4) Say *"Begin"* and start your stopwatch when the student says the first word. If the student fails to say the first word of the passage after 3 seconds, tell them the word, mark it as incorrect, then start your stopwatch.
5) Follow along on your copy. Put a slash (/) through words read incorrectly.
6) At the end of 1 minute, place a bracket ( ]) after the last word and say, *"Stop."*
7) Score and summarize by writing WRC/Errors

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"Familiar" Shortened Directions

When students are assessed frequently and know the directions.

Say:

When I say 'Begin,' start reading aloud at the top of this page.

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Items to Remember

Emphasize Words Read Correctly (WRC). Get an accurate count.

3-Second Rule.

No Other Corrections.

Discontinue Rule.

Be Polite.

Best, not fastest.

Interruptions.

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What is a Word Read Correctly?

Correctly pronounced words within context.

Self-corrected incorrect words within 3 seconds.

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What is an Error?

Mispronunciation of the word

Substitutions

Omissions

3-Second pauses or struggles (examiner provides correct word)

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What is not Incorrect? (Neither a WRC or an Error)

Repetitions

Dialect differences

Insertions (consider them qualitative errors)

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Calculating and R-CBM Scores

Record total number of words read.

Subtract the number of errors.

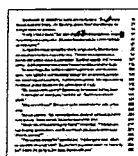Report in standard format of WRC/Errors (72/3).

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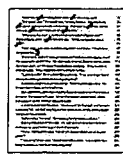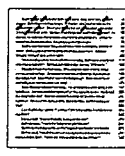

Example: Finding the Baseline Score

67 / 2   85 / 8   74 / 9

1 min.   1 min.   1 min.

Why use Median vs. Average?
Averages are susceptible to outliers when dealing with small number sets.
Median Score is a statistically more reliable number than average for R-CBM.

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Baseline: Obtain **MEDIAN** score for 3 passages:

67 / 2   85 / 8   (74) 9
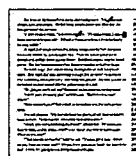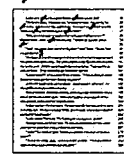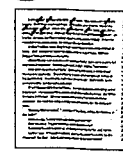
1 min.   1 min.   1 min.
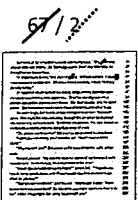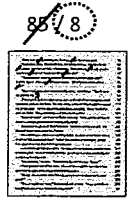
1. Throw out the HIGH and LOW scores for Words Read Correct (WRC)

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Baseline: Obtain MEDIAN score for 3 passages:

67 / 2   85 / 8   (74) 9
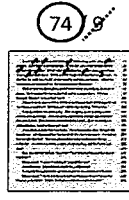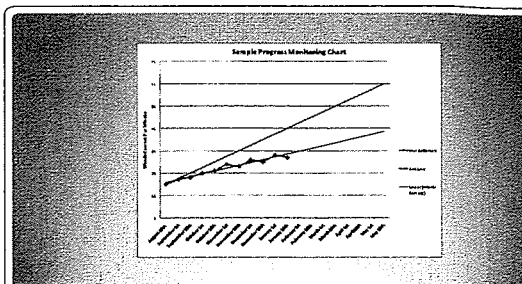
1 min.   1 min.   1 min.

2. Throw out the HIGH and LOW scores for the Errors.

Remaining scores = MEDIAN. ⟶ =74/8

3. Report this score in your AIMSweb account.

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Setting Progress Monitoring Goals
Using Validated Practices

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Base goal setting on logical educational practices:

Logical Educational Practices:

- Parents, students (when age appropriate), and staff should **all understand** the goal

- Parents, students (when age appropriate) should understand **why** and **how** the goal was set

- Know **how long** we have to attain the goal

- Know what the student is **expected to do** when the goal is met

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Determine the Individual Goal: Two Common Methods

1. Norm-referenced
2. Rate of improvement (ROI)

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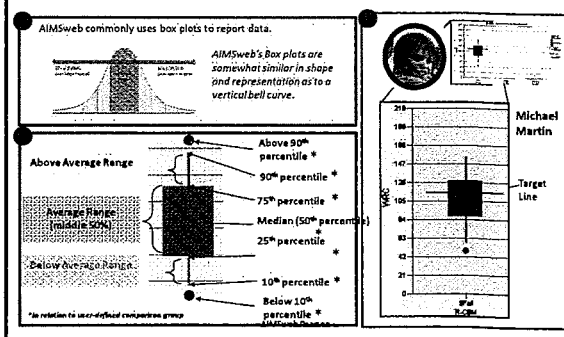

Norm-Referenced (NR) Method
Progress Monitoring Schedule Setup and Goal Setting

Learn Via Case Study: **Michael Martin**

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Box & Whiskers Graphs (box plots): A 3-Step Explanation

Selecting Appropriate Norms: National

• Large norm sample	• Inequities in school resources
• Established cut scores	• Can lead to over/under identification

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Selecting Appropriate Norms: Local

• Correlated with state testing outcomes	• Small Sample
	• Not initially available
• Comparisons within district/state	• Can lead to lower expectations

AIMSweb Pearson
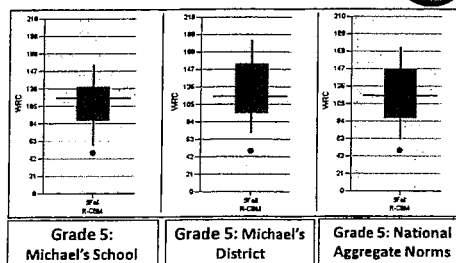
Rate of Improvement
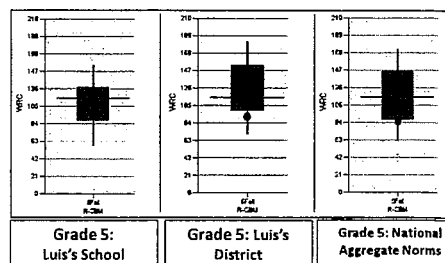
AIMSweb® Growth Table
Reading - Curriculum Based Measurement
Multi-Year Aggregate

Grade	%ile	Fall		Winter		Spring		ROI
		Num	WRC	Num	WRC	Num	WRC	
5	90		172		186		200	0.8
	75		147		161		176	0.8
	50	167354	115	174682	132	174029	147	0.9
	25		89		102		114	0.7
	10		64		77		87	0.6
	Mean		117		131		144	
	StdDev		43		43		43	

Num = Number of Students WRC = Words Read Correct ROI = Rate Of Improvement
ROI is Spring Score minus Fall Score (or Winter minus Fall) divided by 36 weeks (or 18 weeks)

> Compare Michael Martin
> Fall 5th grade Student:
> 48 wrc / 12 errors

*All data and identifying information presented are fictitious.

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Rate of Improvement (ROI)

Before one can write progress monitoring goals using ROI, there are three things to keep in mind:
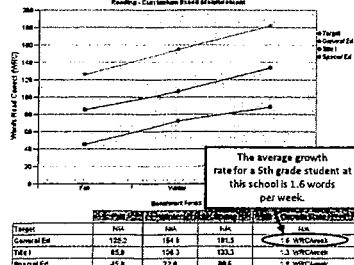
1. What research says is a "realistic" and "ambitious" growth rate

2. What do norms indicate about "good" growth rates

3. Aggregate & Local Norms:
   National vs. your grade/schools growth rate during the first semester or last year.

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ROI: Local Norms: Grade 5

Average Score by Service Code
Washington School District - Jefferson Elementary School
Grade 5 : 2003-2003 School Year
Reading - Curriculum Based Measurement

Using Local Norms: Determine what your class or school grade growth rate was last semester or last year.

> The average growth rate for a 5th grade student at this school is 1.6 words per week.

	Fall	Winter	Spring	Weekly Growth Rate
Target	N/A	N/A	N/A	N/A
General Ed	128.2	154.1	181.5	1.6 WRC/week
Title I	85.9	106.3	133.1	1.3 WRC/week
Special Ed	45.9	72.9	80.6	1.2 WRC/week

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SLA, ROI, and Goals

1. Look at the ROI for a student at the 25th percentile in the goal level material.
2. Consider "doubling" that amount (ROI).

Example:
- If the 25th percentile ROI for 5th grade is 0.7: *Minimally*, multiply
  0.7 x 2 = 1.4 growth rate.

- Next, multiply 1.4 times the # of weeks you plan to progress monitor. This gives you your expected gain score.
  1.4 x 36 weeks = 50.4 wrc

- Add that to the SLA score from the goal level material to determine the final goal.
  50.4 + 48 = 98.4

- Consider rounding to even number, or closest "10"
  98.4 rounded to 100.

> IMPORTANT: When planning a goal and providing intervention, the student must have an ROI greater than average if they are going to catch up!

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All Goal Setting

FAQ: What "number" and grade level do I choose for the goal?

Answer: Set goal at the **grade level** and **score** that you expect the student to perform at the **end of the instructional period.**

(E.g., 9 wks., 18 wks., 36 wks., 52 wks., etc.).

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Progress Monitor Schedule Setup:

Determining the frequency and duration
of assessment based on needs and
resources

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Step 5: How much data should be collected?

Making Data-Based Decisions With Progress Monitor

♣ Typically need at least 7-10 data points (Shinn & Good, 1989) before making programming decision— and you may need to collect more if uncertain.

♣ Christ & Silberglitt (2007) recommended 6-9 data points

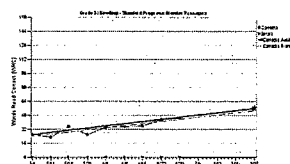♣ As the number of data points increases, the effects of measurement error on the trend line decreases.

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Step 5: How much data should be collected?

Four Criteria To Consider:

Criteria #1. Trend line meets (or is on-target to meet) AIM line for ultimate goal:

Success! Once goal is met, consider transition to less intensive program or new goal as needed.
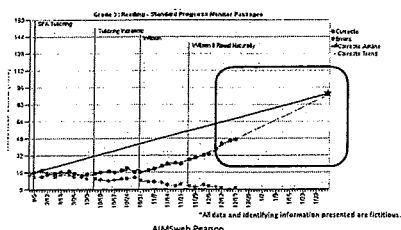

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Step 5: How much data should be collected?

Criteria #2. Trend line and AIM line will intersect in relatively near future?
Keep with current intervention until goal is reached.

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Step 5: How much data should be collected?

Criteria #3a. Trend line exceeds AIM line?
a. Consider *increasing goal or difficulty level*

Grade 5 student reading grade 4 passages. Goal was changed from 104 wrc/min to 125 wrc/min.

NOTE: When changing a goal to require a different grade level of material, start a new schedule.

Do not use the same schedule as the data are not comparable (i.e., 50 wrc/min on a 5th grade passage means something different than 50 wrc/min on a 3rd grade passage.)
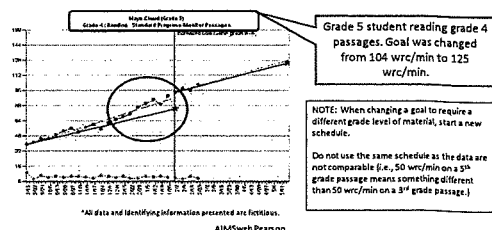
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Step 5: How much data should be collected?

Criteria #3b. Trend line exceeds AIM line?

b. Or, *retain the current intervention and close the gap even faster* if this goal is the final performance level the student is to reach while being progress monitored.

Student may reach goal in mid-March, rather than the end of May if progress continues at same rate of improvement.

Grade K student on Grade K PSF probes.
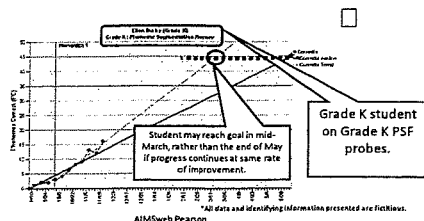
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Step 5: How much data should be collected?

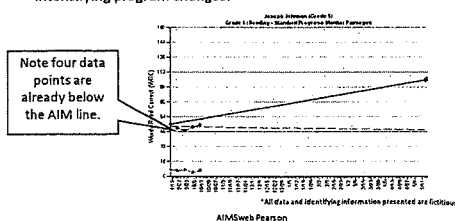Criteria #4. Trend line will not likely intersect AIM line—and/or moves in opposite direction of AIM line:

Consider adding additional intervention, changing variable, and/or intensifying program changes.

Note four data points are already below the AIM line.

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9

Now…Building your confidence:
Developing good judgment in
data analysis

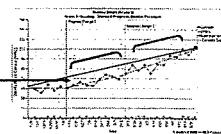When 7-10 data points may be
"too much" or "not enough"

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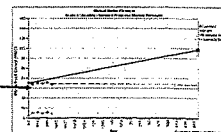

Building Confidence in Decision-Making

2. **Variability of the data:**
   a. The "more variable" the data, the larger the error in the slope.

   The larger the error in the slope, the more data points are needed to gain confidence in the trend/actual progress made.

   b. The "tighter" the data, the fewer the number of data points potentially needed to be "confident" in the trend developing.

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Building Confidence in Decision-Making

3. **The direction of the trend:**
   a. If all the data points are below the aimline <u>and</u> going strongly negative, you will not likely need 7-10 data points to confirm "uh-oh!"

   b. In contrast, if all data points are above the line and in strongly positive direction, the opposite applies—you won't likely need 10 data points to say, "wow" and increase the ambitiousness of your goal.
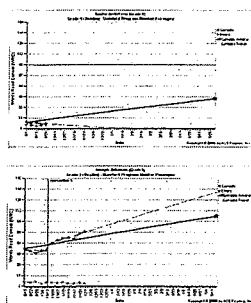
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Building Confidence in Decision-Making

4. **ROI & aimlines are important:**
   Observe data against an "expected rate of progress" or "aimline." The absence of such makes for increased error. (AIMSweb® automatically displays this data, but other systems may not.)
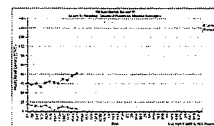
Without aimline or trend lines   With aimline or trend lines
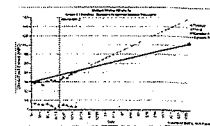
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Further Building Your Confidence in Decision-Making

Data Collection: Balancing the ideal
with the feasible

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How Frequently to Assess?

Balance *IDEAL* with *FEASIBLE*:

Too little data, too infrequently means students may stay in ineffective programs longer than necessary.

See example on next slide.

*All data and identifying information presented are fictitious.
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Building Confidence in Decision-Making

Note that a student may potentially be in an ineffective program longer than needed when data collection is not done frequently enough.
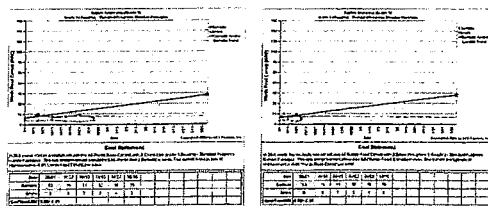
5 data points over 15 weeks.　vs.　5 data points over 5 weeks.

*All data and identifying information presented are fictitious.

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Frequency of Assessment Directly
Related to Student Achievement

Number of assessments/15 weeks	Effect Size (SD)	Percentile Gain
0	0	0
1	.34	13.5
5	.53	20
10	.60	22.5
15	.66	24.5
20	.71	26
25	.78	28.5
30	.82	29

Bangert-Drowns, R. L., Kulik, J. A., & Kulik, C.-L. C. (1991). Effects of frequent classroom testing. Journal of Educational Research, 85, 89-99.
Similar results found by Fuchs & Fuchs (1986)

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Frequency of Assessment Directly
Related to Student Achievement

For interpretive purposes: An effect size of .71 means that a student at the 50th percentile *without* formative evaluation would be expected to perform at the 76th percentile *with* formative evaluation.

An effect size is a measure of the strength of the relationship between two variables in a statistical population.

It is the average difference between two groups.

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Putting It All Together

- Select Evidence Based Progress Monitoring Tools (www.rti4success.org)
- Establish Systematic Data Analysis Procedures
- Establish Data Review Teams
- Ensure Accuracy of Implementation

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Thank You!

•Complete the evaluation
•Practice, Practice, Practice

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Progress Monitoring Graph

Name: _____

Goal: _____

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
150																				
145																				
140																				
135																				
130																				
125																				
120																				
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Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20